STREET LIGHT CONTROLLER ZHAGA LR-1

TECHNICAL SPECIFICATION

Revision history

Revision	Author	Date	Changes
R1	T. P.	08.2023.	First release
R2	T.P.	01.2024.	Features update

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1 Copyright Disclaimer

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2 Product variants and options

Street light controller described in this document comes in the basic version and in special versions according to customer orders, both are described in designated special technical specifications.

Street light controller has the following options for additional features:

- Adding FRAM non-volatile memory for recording device's measurement readings
- Adding modules for geolocation features, light intensity measurement and Bluetooth communication

3 Device functionality

This document describes technical specifications of the device for controlling the streetlamps designed and manufactured in X-LOGIC d.o.o.

This document covers the streetlamp controllers with LoRaWAN communication interface.

One device controls one lamp with one LED driver. Streetlamp must have a suitable fixture and wiring compatible with Zhaga Book 18 standard.

On 4-pin Zhaga connector 3 pins are used:

- +24V power supply from LED driver inside the lamp
- GND i.e., DALI-
- DALI+

Controller uses DALI2 protocol for connecting to LED driver inside lamps. Controller provides power for DALI2 bus.

Main function of the controller is adjusting the light intensity. Secondary function is reading the operating parameters of the LED driver. Parameter reading and control is described in detail in document:

ZHAGA_LR-1_LoRaWAN_light_controller_command_spec

4 Dimensions and assembly

The device is fixed inside the cylindrical housing with a Zhaga Book 18 compatible holder for mounting on a lamp.

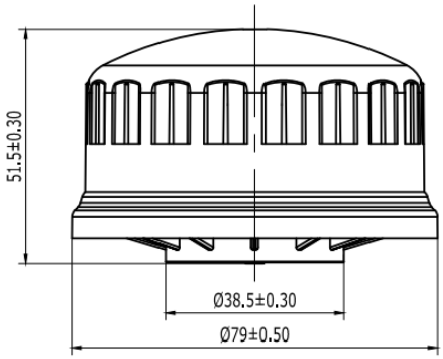

Figure 1: Zhaga Book 18 cylindrical housing dimensions, side view.

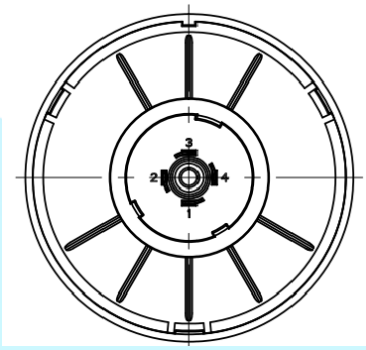

Figure 2: Zhaga housing, bottom view and connector.

5 Appearance and labelling

It is possible to order different PCB colouring, change of labelling content as well as variants associated with serial production without change of the device's functionality.

6 Technical characteristics

Table 1: Technical characteristics of streetlamp controller.

GENERAL PROPERTIES	
Power supply	24V via Zhaga connector
Maximum current	20mA
Operating temperature	-40 to +85°C
IP protection	IP66
Anti-fog vent	Yes
Overvoltage protection	Yes, for LoRaWAN antenna
LoRaWAN	Class C (continuous reception), OTAA join, 868 MHz EU region. Downlink command configuration option for period setting (default value is 30 s). The period defines the time frame within join starts after the device had been restarted. LoRaWAN module uses supercapacitor for back-up power in a way that main processor detects 24V drop down and sets LoRaWAN module in a sleep mode before 24 V power supply is completely turned off. In this way join state remains recorded resulting that device does not need to perform join when 24 V power supply is turned on again unless the energy of supercapacitor had been discharged in the meantime.
LoRaWAN multicast	Yes, multicast group and associated keys are configurable with downlink command.
LoRaWAN listen-before-talk	Yes, ensures that sending does not collide with sending of another device, i.e., device waits to send until no one broadcasts on its channel
LoRaWAN DevEUI and AppKey	DevEUI comes in QR code on label sticker underneath transparent top cover which makes it easy to scan. AppKey is unique for each device and is given in xlsx file.
ADR (Adaptive Data Rate)	Yes, enabled by default. It is configurable with downlink command.
Supercapacitor	Yes. Used for power back-up of RTC and LoRaWAN module when the power supply is turned off. Usual total back-up period is around 72 hours.
Brightness level control	Yes, 0 – 100%, or down to minimum level allowed by LED driver
Reading energy parameters	Yes, supported parameters: Apparent power [VA] Apparent energy [Vah] Active power [W] Active energy [Wh]

	Loadside power [W] Loadside energy [Wh] Power factor [%] Supply (AC) voltage [Vrms] Light source voltage (DC) [0.1 V] Light source current [mA] Light source total on-time [s] Light source on-time since last power-on [s] LED driver total on-time [s]
Periodical sending of status messages	Yes, configurable sending period from minimum value of 1 min in steps of 1 min
Periodical sending of power measurements	Yes, configurable sending period from minimum value of 1 min in steps of 1 min
Reading of arbitrary DALI2 parameters on downlink command	Yes. Reading of any DALI2 parameter is enabled. Special command enables sending any DALI2 query and receiving query response from LED driver.
Configurable sending period of status messages with ACK request	Yes. It is configurable to set number of status messages after which status message with ACK request (downlink ACK response from network server is requested) is being send. It is possible to configure sending ACK request after each status message with downlink command.
Sending status messages on each light intensity change	Yes. When using automatic profile regulation, it is possible to configure with downlink command sending of status message on each light intensity change.
Configuring parameters over downlink command	Yes
Local storage of measured power parameters	In standard version the measured data is being sent upon measurement reading meaning that measurement period is equal to sending period. The measured data is not being stored after sending.
Adjustable time in controller	Yes – with downlink command or retrieving the exact time from the network server when joining (synchronization enabled by network servers by default)
Real Time Clock	Yes, backed up with supercapacitor (saves the time while the lamp is without power). UTC time format. Automatic change between wintertime and summertime.
GPS receiver in the device	Not in standard version. Available upon request.
DALI2 bus power supply	Yes, 16V
Autonomous brightness regulation profile	Yes. <u>Available options:</u> 1. Defined time periods from power on, i.e. 1 hour on 100%, 2 hours on 80%, 2 hours on 50% etc. 2. Defined time periods from defined time, the same as 1st option but with the start from defined time obtained from internal clock 3. Defined time periods as a result from percentage of measured power-on time (night duration), i.e. 20% of night duration with 100% light intensity, etc.

	4. Turning on/off via astronomical clock using manually entered geographical coordinates (configurable change with downlink command) and time. The lamp turns on the first step and later performs under configured profile.
Special settings for days in the week, weekends and holidays (defined dates)	Yes, enabled.
Possibility of setting temporary fixed light intensity	Yes. It is possible to avoid current active profile and set fixed light intensity with defined duration.
Operation in case of unsuccessful LoRaWAN join	According to last activated profile
Operation in case of lost RTC time	Brightness fixed to 100% intensity
EEPROM parameter storage	Yes. After being set, parameters are stored in EEPROM after each configuration command.
Zhaga cerfified enclosure	Yes
Antenna	Yes, integrated.

7 Environmental

Streetlamp controller device shall be disposed of and recycled following all applicable rules in your region.

In case of any questions about the disposal of electronic waste, contact X-LOGIC.